

PATENT ABSTRACTS OF JAPAN

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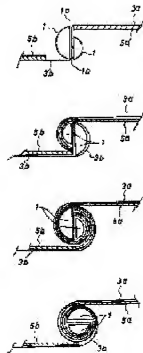
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(54) MANUFACTURE OF WINDING TYPE ELECTRODE AND MANUFACTURING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To manufacture a cylindrical winding type electrode in high yield by inserting a tape-like insulating sheet between flat facing surfaces of a pair of winding core bodies having a half circle cross section, and rotating the winding core bodies so that the insulating sheet positions between a tape-like positive sheet and a tape-like negative sheet to stack and wind them.

SOLUTION: Tape-like insulating sheets 3a, 3b are inserted between separated, facing flat parts 1a, 1b of a pair of winding core bodies 1 having a half circle cross section. The tip of a tape-like positive sheet 5a is approached to the non-facing surface part of the facing flat part 1a for positioning, and the tip of the tape-like negative sheet 5b is shifted in the specified position from the winding core body 1, and both sheets 5a, 5b are arranged along the insulating sheets 3a, 3b. In this state, a rotating mechanism is driven, the winding core bodies 1 are rotated 180° in the constant direction, the tip of the positive sheet 5a is let coincide with the tip of the negative sheet 5b. By further rotating 360°, a good winding type electrode with no step difference between the positive sheet 5a and the negative sheet 5b is formed.



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Notes:

1. Untranslatable words are replaced with asterisks (****).
2. Texts in the figures are not translated and shown as it is.

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FULL CONTENTS

[Claim(s)]

[Claim 1] The process which carries out insertion arrangement of the tape-like insulation sheet for layer insulation between the flat opposed faces of a pair of cross-sectional semicircular state winding core objects on which a part of outside of at least one flat part was exposed, The process which make the tip part of a tape-like positive electrode sheet and a tape-like negative electrode sheet opposite-** to the non-opposed face of the flat part to which said cross-sectional semicircular state winding core object counters, and a tape-like insulation sheet is made to meet, respectively, and is arranged, The manufacture method of the wound type electrode characterized by having the process which said a pair of winding core objects are rotated in the fixed direction, and carries out the lamination and **** of a positive electrode sheet, an insulation sheet, and the negative electrode sheet, and forms them into a wound type electrode to the circumference surface of a winding core object.

[Claim 2] A pair of cross-sectional semicircular state winding core objects to which the field which counters mutually became flat and the position shift of the flat side was carried out, The manufacturing installation of the wound type electrode characterized by providing the means which holds the opposite flat face-to-face one of said cross-sectional semicircular state winding core object, and carries out one immobilization of a pair of cross-sectional semicircular state winding core objects, and the rotary machine style which rotates said a pair of cross-sectional semicircular state winding core objects in the predetermined direction.

[Claim 3] A pair of cross-sectional semicircular state winding core objects where the field which counters mutually becomes flat and which differ in a path, The manufacturing installation of the wound type electrode characterized by providing the means which holds the opposite flat face-to-face one of said cross-sectional semicircular state winding core object, and carries out one immobilization of a pair of cross-sectional semicircular state winding core objects, and the rotary machine style which rotates said a pair of cross-sectional semicircular state winding core objects in the predetermined direction.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture method that a cylindrical shape-like wound

type electrode can be manufactured with the sufficient yield, and the manufacturing installation which can manufacture a cylindrical shape-like wound type electrode with the sufficient yield.

[0002]

[Description of the Prior Art] the wound type electrode (electromotive part) which loops around the layered product of a positive electrode sheet, an insulation sheet, a negative electrode sheet, and an insulation sheet -- the inside of the exterior container of a cylindrical shape -- liquid -- practical use is widely presented with the secondary battery of composition of having ****(ed) densely etc. And about this kind of secondary battery, improvement in a power supply function is expected, for example with the request of cordless-izing of electric devices, such as a portable telephone and a portable PC, highly-efficient-izing, and a small weight saving.

[0003] By the way, electromotive part formation of said cylindrical shape is performed as follows. Namely, 1 have the cross-sectional semicircular state part which forms a pair of flat surface parts which counter, or two winding core objects are prepared. While making flat face-to-face [said / which counters] pinch an insulation sheet (separator), and giving necessary physical relationship to this insulation sheet and arranging a positive electrode sheet and a negative electrode sheet to it By rotating a winding core object as the virtual center axis (a winding core object and same axle), it involves in in the form which made the insulation sheet the separator, and the wound type electrode (electromotive part) is manufactured.

[0004]

[Problem to be solved by the invention] However, in the manufacture method of said conventional wound type electrode, there are the following inconvenient problems. That is, in the case in particular of the wound type electrode for the object for lead secondary batteries, or nickel cadmium secondary batteries, it was satisfactory, but in being the object for nickel hydrogen secondary batteries by which high capacity-ization is attained, it is in the tendency for the thickness of a positive electrode sheet and a negative electrode sheet to become thick. [here / that the thickness of a positive electrode sheet and a negative electrode sheet becomes thick] In **** (winding) between which it is placed [make] by the separator, and the formation of a wound type electrode, it often happens that the level difference [begin] which each electrode sheet made for there to be along the peripheral face of a cross-sectional semicircular state part rolls affects the form after the formation of a wound type electrode, and changes with a cross-sectional ellipse-shaped wound type electrode.

[0005] Moreover, when the level difference part [begin] which said electrode sheet rolls serves as an overall diameter part of a wound type electrode and equips in the exterior container of a cylindrical shape, the periphery part of a wound type electrode is damaged, or wearing into an exterior container is very difficult. Problems, such as such damage to a wound type electrode periphery part, meant spoiling the performance and reliability of a secondary battery which are manufactured, or inviting reduction of a manufacturing yield, and have raised the practically grave problem.

[0006] This invention coped with the above-mentioned situation, was made, a positive electrode sheet and a negative electrode sheet begin to roll it, it cancels the influence of a level difference, and aims at offer of the manufacture method and manufacturing installation which can create the wound type electrode of the shape of a cylindrical shape with good accuracy with the sufficient yield.

[0007]

[Means for solving problem] The process to which invention of Claim 1 carries out insertion arrangement of

the tape-like insulation sheet for layer insulation between the flat opposed faces of a pair of cross-sectional semicircular state winding core objects on which a part of outside of at least one flat side was exposed, The process which make the tip part of a tape-like positive electrode sheet and a tape-like negative electrode sheet opposite-** to the non-opposed face of the flat part to which said cross-sectional semicircular state winding core object counters, and a tape-like insulation sheet is made to meet, respectively, and is arranged, It is the manufacture method of the wound type electrode characterized by having the process which said a pair of winding core objects are rotated in the fixed direction, and carries out the lamination and **** of a positive electrode sheet, an insulation sheet, and the negative electrode sheet, and forms them into a wound type electrode to the circumference surface of a winding core object. A pair of cross-sectional semicircular state winding core objects to which the field which counters mutually made invention of Claim 2 flat, and the position shift of the flat side was carried out, It is the manufacturing installation of the wound type electrode characterized by providing a means to hold the opposite flat face-to-face one of said cross-sectional semicircular state winding core object, and to fix a pair of cross-sectional semicircular state winding core objects in one, and the rotary machine style which rotates said a pair of cross-sectional semicircular state winding core objects in the predetermined direction.

[0008] A pair of cross-sectional semicircular state winding core objects where the field which counters mutually makes invention of Claim 3 flat and which differ in a path, It is the manufacturing installation of the wound type electrode characterized by providing a means to hold the opposite flat face-to-face one of said cross-sectional semicircular state winding core object, and to fix a pair of cross-sectional semicircular state winding core objects in one, and the rotary machine style which rotates said a pair of cross-sectional semicircular state winding core objects in the predetermined direction.

[0009] In this invention, only the shape what is called of a tape shall not have **, and a tape-like positive electrode sheet, a tape-like negative electrode sheet, and a tape-like insulation sheet shall contain band-like **, such as the shape of a strip of paper.

[0010] the form where the tip part of the tape-like positive electrode sheet and the tape-like negative electrode sheet wound along with a tape-like insulation sheet was opposite-**(ed) by the non-opposed face of the flat part which a winding core object counters in invention of above-mentioned Claim 1 -- if it puts in another way At least one electrode sheet begins to wind, and the level difference of a tip part is wound and formed into a wound type electrode with the form canceled and reduced. Therefore, the shape-ization of an ellipse resulting from said level difference etc. is canceled certainly or sharply, the wound type electrode of a cylindrical form with good accuracy can be obtained with the sufficient yield, and it contributes to offer of a reliable secondary battery greatly.

[0011] Moreover, in invention of Claim 2, since the flat side of an electrode sheet which it began to wind [side] and carried out the position shift of the tip part is made to opposite-** and the cause of a level difference development is canceled or reduced, an operation of said Claim 1 is attained more easily.

[0012] Furthermore, in invention of Claim 3, since it is made to opposite-** to the flat side which an electrode sheet begun to wind [side] and exposed the tip part in part based on the difference in a path (width) and the cause of a level difference development is canceled or reduced, an operation of said Claim 1 is attained more easily.

[0013]

[Mode for carrying out the invention] Following drawing 1 (a), (b), drawing 2 (a) - A work example is

explained with reference to (c) and drawing 3 . Drawing 1 (a), (b) shows the example of important section composition of the manufacturing installation of a mutually different wound type electrode in section. Namely, drawing 1 The integral-type winding core object 1 with which (a) made the flat parts 1a and 1b of cross-sectional semicircular state isolate and counter, The rotary machine style 2 which rotates said winding core object 1 in the fixed direction, and the insulation sheet rewinding roll 3 and 3' which supply the necessary insulation sheets 3a and 3b to said winding core object 1 through Guide 4a, It is with the electrode sheet rewinding roll 5 and 5' which supply the same positive electrode sheet 5a necessary to the winding core object 1, and the negative electrode sheet 5b through Guides 4b and 4c, respectively. And said winding core object 1 takes the composition made to isolate and counter by the length of the grade to which the flat parts 1a and 1b of cross-sectional semicircular state can insert or fasten the insulation sheet 3a (3b), and is changing the width (diameter of a cross-sectional semicircle) 1a and 1b of the opposite flat side. [0014] Moreover, drawing 1 In (b), the winding core object 1 which two flat parts 1a and 1b of cross-sectional semicircular state of winding core object member 1' were made to isolate and counter, and carried out fixed composition at the integral type was used, and also it is said drawing 1 . It is the same as that of the composition illustrated to (a).

[0015] next, drawing 2 (a) - referring to (c) -- said drawing 1 (a) -- or -- The example of manufacture of a basing-on manufacturing installation of composition of having illustrated to (b) winding type electrode is explained.

[0016] First, drawing 2 As superficially shown in (a), between isolation / opposite flat part 1a of the winding core object 1, and 1b For example, thickness while inserting or fastening the insulation sheet of 0.2mm and the shape of a 60-mm-wide tape For example, thickness [the part] while carrying out opposite ** and position doubling of the tip part of the positive electrode sheet 5a of 0.8mm and the shape of a 57-mm-wide tape to the non-opposed face part of said opposite flat part 1a For example, thickness The tip part of the negative electrode sheet 5b of 0.5mm and the shape of a 57-mm-wide tape, the insulation sheets 3a and 3b are made to meet, respectively, and it arranges. [object / 1 / winding core] [a predetermined position]

[0017] Thus, after carrying out positioning arrangement of tape-like the insulation sheets 3a and 3b, the positive electrode sheet 5a, and the negative electrode sheet 5b, the rotary machine style 2 is made to drive, and it is in the fixed direction about the winding core object 1. 180 degrees is rotated. By this rotation, it is drawing 2 . It is drawing 2 , when it becomes the form where the tip part of the positive electrode sheet 5a and the negative electrode sheet 5b gathered and 360° rotations are carried out further, as superficially shown in (b). as superficially shown in (c) The positive electrode sheet 5a and the negative electrode sheet 5b are wound or ****(ed) cylindrical without beginning to wind and producing a level difference, and the good wound type electrode of a cylindrical form is formed. In addition, it is by the above. [when 180 degrees rotated, considered it as the form where the tip part of the positive electrode sheet 5a and the negative electrode sheet 5b gathers, but (drawing 2 (b))] Drawing 2 As superficially shown in (d), the wound type electrode of a cylindrical form which begins to wind also as a form where about 90 degrees of tip parts of the positive electrode sheet 5a and the negative electrode sheet 5b shifted, and does not almost have the influence of a level difference can be formed.

[0018] Drawing 3 is the case where the flat side where a pair of cross-sectional semicircular state winding core objects 1 counter mutually is considered as the composition which carried out the position shift, and other composition and mechanisms are the same as that of the manufacturing installation of said illustration.

In this case, while inserting or fastening a tape-like insulation sheet between the opposite flat side 1a of the cross-sectional semicircular state winding core object 1, and 1b After carrying out opposite ** and position doubling of each tip part of the tape-like positive electrode sheet 5a and the negative electrode sheet 5b to the non-opposed face part (field which has shifted) of the opposite flat parts 1a and 1b, the rotary machine style 2 is made to drive and the winding core object 1 is rotated in the fixed direction. Then, said drawing 2 Like the case where it is superficially shown in (c), the positive electrode sheet 5a and the negative electrode sheet 5b are wound or ****(ed) cylindrical without beginning to wind and producing a level difference, and the good wound type electrode of a cylindrical form is formed.

[0019] In addition, this invention is not limited to the above-mentioned work example, and can take various modification in the range which does not deviate from the meaning of invention. for example, the kind of target secondary battery [width / of an insulation sheet, a positive electrode sheet, and a negative electrode sheet / thickness, width, etc.] and capacity -- ** -- it corresponds and can set up suitably.

[0020]

[Effect of the Invention] Since the good wound type electrode of a cylindrical form with which the shape-ization of an ellipse which a tape-like positive electrode sheet and a tape-like negative electrode sheet begin to wind, and originates in the level difference of a part was canceled can be obtained with the sufficient yield according to invention of Claim 1, it contributes to offer of a reliable secondary battery greatly.

[0021] Since the level difference development which an electrode sheet begins to wind and originates in a tip part is canceled or reduced according to invention of Claim 2 and Claim 3, the good wound type electrode of a cylindrical form can be obtained with the sufficient yield, and it contributes to offer of a reliable secondary battery greatly.

[Brief Description of the Drawings]

[Drawing 1] (a), (b) is the sectional view showing the important section of a mutually different constructional example of wound type ***** concerning this invention.

[Drawing 2] It is what shows typically the example of a manufacture embodiment by wound type ***** concerning this invention. (a) is a negative electrode sheet tip part to a positive electrode sheet tip part. The top view showing the state where 180 degrees and it positioned, (b) is a winding core object. Top view showing the state when rotating 180 degrees, (c) is a winding core object. Top view showing the state when rotating 360 degrees, (d) is the top view showing the state where the negative electrode sheet tip part 90 degrees, and it was positioned to the positive electrode sheet tip part.

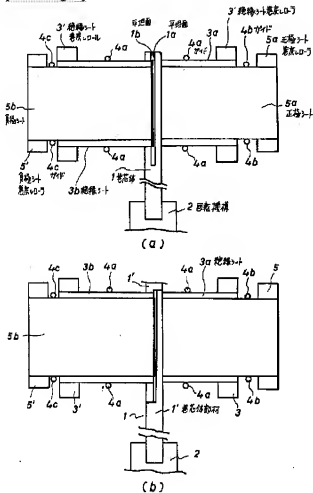
[Drawing 3] The positive electrode sheet tip part and negative electrode sheet tip part in the example of a manufacture embodiment by wound type ***** of the others concerning this invention Top view showing the state where 180 degrees and it positioned.

[Explanations of letters or numerals]

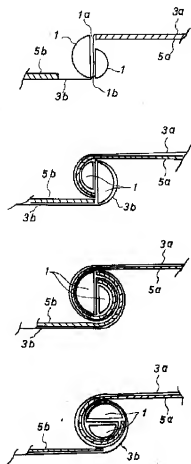
- 1 Winding core object
- 1' Winding core object member
- 2 Rotary machine style
- 3 3' Tape-like insulation sheet rewinding roll

3a, 3b Tape-like insulation sheet
4a, 4b, 4c Tape running guide
5 5' Tape-like electrode sheet rewinding roll
5a Tape-like positive electrode sheet
5b Tape-like negative electrode sheet

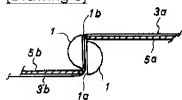
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]

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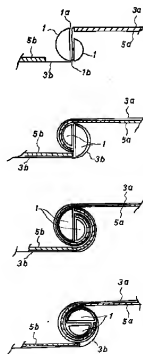
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(54) 【発明の名称】 捲回型電極の製造方法および製造装置

(57) 【要約】

【課題】 正極シートおよび負極シートの巻き始め段差の影響を解消し、精度の良い円筒形状の捲回型電極を歩留まりよく作成できる製造方法および製造装置の提供を目的とする。

【解決手段】 少なくとも一方の平坦面1aもしくは1bの外側の一部を露出させた一対の断面半円状巻芯体1の平坦面対向面1a、1b間に層間絶縁用のテープ状絶縁シート3a、3bを挿着配置する工程と、前記断面半円状巻芯体1の対向する平坦部1a、1bの露出面にテープ状正極シート5a、テープ状負極シート5bの先端部を対接させ、かつそれぞれテープ状絶縁シート3a、3bに沿わせて配置する工程と、前記一対の巻芯体1を一定の方向に回転させて、巻芯体1の円周面に正極シート5a、絶縁シート3aもしくは1b、負極シート5bを積層・捲装して捲回型電極化する工程とを有することを特徴とする捲回型電極の製造方法である。



1

【特許請求の範囲】

【請求項1】 少なくとも一方の平坦部の外側の一部を露出させた一対の断面半円状巻芯体の平坦な対向面間に層間絶縁用のテープ状絶縁シートを挿着配置する工程と、

前記断面半円状巻芯体の対向する平坦部の非対向面にテープ状正極シート、テープ状負極シートの先端部を対接させ、かつそれぞれテープ状絶縁シートに沿わせて配置する工程と、

前記一対の巻芯体を一定の方向に回転させて、巻芯体の円周面に正極シート、絶縁シートおよび負極シートを積層・捲装して捲回型電極化する工程とを有することを特徴とする捲回型電極の製造方法。

【請求項2】 互いに対向する面が平坦化し、かつ平坦面を位置ズレさせた一対の断面半円状巻芯体と、

前記断面半円状巻芯体の対向平坦面間を保持して一対の断面半円状巻芯体を一体的に固定する手段と、

前記一対の断面半円状巻芯体を所定方向に回転させる回転機構とを具備することを特徴とする捲回型電極の製造装置。

【請求項3】 互いに対向する面が平坦化し、かつ径が異なる一対の断面半円状巻芯体と、

前記断面半円状巻芯体の対向平坦面間を保持して一対の断面半円状巻芯体を一体的に固定する手段と、

前記一対の断面半円状巻芯体を所定方向に回転させる回転機構とを具備することを特徴とする捲回型電極の製造装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、円筒形状の捲回型電極を歩留まりよく製造できる製造方法、および円筒形状の捲回型電極を歩留まりよく製造できる製造装置に関する。

【0002】

【従来の技術】正極シート、絶縁シート、負極シートおよび絶縁シートの積層体を巻装して成る捲回型電極（起電部）を、円筒形の外装容器内に液密に封装した構成の二次電池などが広く実用に供されている。そして、この種の二次電池については、たとえば携帯電話機や携帯型パソコンなど、電子機器のコードレス化、高性能化、小型軽量化の要望に伴って、電源機能の向上が期待されている。

【0003】ところで、前記円筒形の起電部形成は、次のように行われている。すなわち、一対の対向する平坦面を形成する断面半円状部を有する1本もしくは2本の巻芯体を用意し、前記対向する平坦面間に絶縁シート（セパレータ）を挟持させ、かつこの絶縁シートに正極シート、負極シートを所要の位置関係を持たせて配置する一方、その仮想中心軸（巻芯体と同軸）として巻芯体を回転させることによって、絶縁シートをセパレータと

2

した形で巻き込み、捲回型電極（起電部）を製造している。

【0004】

【発明が解決しようとする課題】しかしながら、前記従来の捲回型電極の製造方法の場合には、次のような不都合な問題がある。すなわち、鉛二次電池用もしくはニッケルカドミウム二次電池用の捲回型電極の場合は、特に問題なかったが、高容量化が図られるニッケル水素二次電池用の場合には、正極シートおよび負極シートの厚さが厚くなる傾向にある。ここで、正極シートおよび負極シートの厚さが厚くなることは、セパレータを介在させての捲装（捲回）、捲回型電極化において、断面半円状部の外周面に沿わせた各電極シート巻き始めの段差が、捲回型電極化後の形状に影響を及ぼし、断面楕円形状の捲回型電極と成ることがしばしば起こる。

【0005】また、前記電極シートの巻き始めの段差部が、捲回型電極の最大径箇所となって、円筒形の外装容器内に装着するとき、捲回型電極の外周部が損傷されたり、あるいは外装容器内への装着が極めて困難だったりする。このような、捲回型電極外周部の損傷などの問題は、製造される二次電池の性能や信頼性を損ない、あるいは製造歩留まりの低減を招来することを意味し、実用上由々しい問題を提起している。

【0006】本発明は上記事情に対処してなされたもので、正極シートおよび負極シートの巻き始め段差の影響を解消し、精度の良い円筒形状の捲回型電極を歩留まりよく作成できる製造方法および製造装置の提供を目的とする。

【0007】

【課題を解決するための手段】請求項1の発明は、少なくとも一方の平坦部の外側の一部を露出させた一対の断面半円状巻芯体の平坦な対向面間に層間絶縁用のテープ状絶縁シートを挿着配置する工程と、前記断面半円状巻芯体の対向する平坦部の非対向面にテープ状正極シート、テープ状負極シートの先端部を対接させ、かつそれぞれテープ状絶縁シートに沿わせて配置する工程と、前記一対の巻芯体を一定の方向に回転させて、巻芯体の円周面に正極シート、絶縁シートおよび負極シートを積層・捲装して捲回型電極化する工程とを有することを特徴とする捲回型電極の製造方法である。請求項2の発明は、互いに対向する面が平坦化し、かつ平坦面を位置ズレさせた一対の断面半円状巻芯体と、前記断面半円状巻芯体の対向平坦面間を保持して一対の断面半円状巻芯体を一体的に固定する手段と、前記一対の断面半円状巻芯体を所定方向に回転させる回転機構とを具備することを特徴とする捲回型電極の製造装置である。

【0008】請求項3の発明は、互いに対向する面が平坦化し、かつ径が異なる一対の断面半円状巻芯体と、前記断面半円状巻芯体の対向平坦面間を保持して一対の断面半円状巻芯体を一体的に固定する手段と、前記一対の

断面半円状巻芯体を所定方向に回転させる回転機構とを具備することを特徴とする捲回型電極の製造装置である。

【0009】本発明において、テープ状正極シート、テープ状負極シートおよびテープ状絶縁シートは、いわゆるテープ状だけでなく、短冊状など帯状のものを含むものとする。

【0010】上記請求項1の発明では、テープ状絶縁シートに沿って捲回するテープ状正極シート、テープ状負極シートの先端部が、巻芯体の対向する平坦部の非対向面に对接された形、換言すると、少なくとも一方の電極シートの巻き始め先端部の段差が解消、低減された形態で捲回されて捲回型電極化される。したがって、前記段差に起因する楕円状化など確実に、もしくは大幅に解消されて、精度の良い良好な円筒形状の捲回型電極を歩留まりよく得ることができ、信頼性の高い二次電池の提供に大きく寄与する。

【0011】また、請求項2の発明では、電極シートの巻き始め先端部を位置ズレさせた平坦面に対接させ、段差発生の原因が解消もしくは低減されるため、前記請求項1の作用がより容易に達成される。

【0012】さらに、請求項3の発明では、電極シートの巻き始め先端部を径（幅）の異なりに基づいて一部露出させた平坦面に対接させ、段差発生の原因が解消もしくは低減されるため、前記請求項1の作用がより容易に達成される。

【0013】

【発明の実施の形態】以下図1 (a)、(b)、図2 (a)～(c)および図3を参照して実施例を説明する。図1 (a)、(b)は、互いに異なる捲回型電極の製造装置の要部構成例を断面的に示したものである。すなわち、図1 (a)は断面半円状の平坦部1a、1bを離隔・対向させた一体型の巻芯体1と、前記巻芯体1を一定の方向に回転させる回転機構2と、前記巻芯体1に所要の絶縁シート3a、3bをガイド4aを介して供給する絶縁シート巻き戻しロール3、3'と、同じく巻芯体1に所要の正極シート5a、負極シート5bをガイド4b、4cを介してそれぞれ供給する電極シート巻き戻しロール4、5'とである。そして、前記巻芯体1は、断面半円状の平坦部1a、1bが絶縁シート3a (3b) を挿着もしくは挟着する程度の長さで離隔・対向させた構成を採り、かつその対向平坦面の幅（断面半円径）1a、1bを異ならせている。

【0014】また、図1 (b)の場合は、2個の巻芯体部材1'の断面半円状の平坦部1a、1bを離隔・対向させて一体型に固定構成した巻芯体1を用いた他は、前記図1 (a)に示した構成と同様である。

【0015】次に、図2 (a)～(c)を参照して、前記図1 (a)もしくは(b)に示した構成の製造装置による捲回型電極の製造例について説明する。

【0016】先ず、図2 (a)に平面的に示すごとく、巻

芯体1の離隔・対向平坦部1a、1b間、たとえば厚さ0.2mm、幅60mmのテープ状の絶縁シートを挿着もしくは挟着する一方、たとえば厚さ0.8mm、幅57mmのテープ状の正極シート5aの先端部を、前記対向平坦部1aの非対向面部に对接・位置合わせするとともに、たとえば厚さ0.5mm、幅57mmのテープ状の負極シート5bの先端部を巻芯体1から所定位置にズラして、それぞれ絶縁シート3a、3bに沿わせて配置する。

【0017】このように、テープ状の絶縁シート3a、3b、正極シート5aおよび負極シート5bを位置決め配置した後、回転機構2を駆動させ、巻芯体1を一定の方向に180°回転させる。この回転によって、図2 (b)に平面的に示すごとく、正極シート5aおよび負極シート5bの先端部が揃った形となり、さらに、360°回転させると、図2 (c)に平面的に示すように、正極シート5aおよび負極シート5bは巻き始め段差を生じないで、円筒状に捲回もしくは捲装されて、良好な円筒形状の捲回型電極が形成される。なお、前記では180°回転したときに、正極シート5aおよび負極シート5bの先端部が揃う形としたが（図2 (b)）、図2 (d)に平面的に示すごとく、正極シート5aおよび負極シート5bの先端部が90°程度ズレた形としても、巻き始め段差の影響がほとんどない円筒形状の捲回型電極を形成できる。

【0018】図3は、一对の断面半円状巻芯体1の互いに対向する平坦面を位置ズレさせた構成とした場合であり、その他の構成・機構は前記例示の製造装置と同様である。この場合には、断面半円状巻芯体1の対向平坦部1a、1b間にテープ状の絶縁シートを挿着もしくは挟着する一方、テープ状の正極シート5aおよび負極シート5bの各先端部を、対向平坦部1a、1bの非対向面部（ズレている面）に对接・位置合わせした後、回転機構2を駆動させて、巻芯体1を一定の方向に回転させる。すると、前記図2 (c)に平面的に示した場合と同様に、正極シート5aおよび負極シート5bは巻き始め段差を生じないで、円筒状に捲回もしくは捲装されて、良好な円筒形状の捲回型電極が形成される。

【0019】なお、本発明は、上記実施例に限定されるものでなく、発明の趣旨を逸脱しない範囲でいろいろの変形を採り得る。たとえば、絶縁シート、正極シート、負極シートの厚さや幅などは対象とする二次電池の種類、容量と対して適宜設定できる。

【0020】

【発明の効果】請求項1の発明によれば、テープ状正極シート、テープ状負極シートの巻き始め部の段差に起因する楕円状化などが解消された良好な円筒形状の捲回型電極を歩留まりよく得ることができるので、信頼性の高い二次電池の提供に大きく寄与する。

【0021】請求項2および請求項3の発明によれば、電極シートの巻き始め先端部に起因する段差発生が解消もしくは低減されるため、良好な円筒形状の捲回型電極

5

を歩留まりよく得ることができ、信頼性の高い二次電池の提供に大きく寄与する。

【図面の簡単な説明】

【図1】(a)、(b)は本発明に係る捲回型電製造装置の互いに異なる構造例の要部を示す断面図。

【図2】本発明に係る捲回型電製造装置による製造実施態様例を模式的に示すもので、(a)は正極シート先端部に対して、負極シート先端部を 180° スラして位置決めした状態を示す平面図、(b)は巻芯体を 180° 回転させたときの状態を示す平面図、(c)は巻芯体を 360° 回転させたときの状態を示す平面図、(d)は正極シート先端部に対して、負極シート先端部を 90° スラして位置決めした状態を示す平面図。

【図3】本発明に係る他の捲回型電製造装置による製造

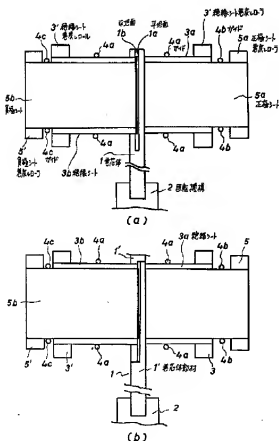
6

実施態様例における正極シート先端部および負極シート先端部を 180° スラして位置決めした状態を示す平面図。

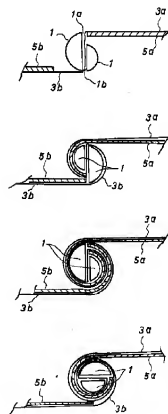
【符号の説明】

- 1 ……巻芯体
- 1' ……巻芯体部材
- 2 ……回転機構
- 3, 3' ……テープ状絶縁シート巻き戻しロール
- 3a, 3b ……テープ状絶縁シート
- 4a, 4b, 4c ……テープ走行ガイド
- 5, 5' ……テープ状電極シート巻き戻しロール
- 5a ……テープ状正極シート
- 5b ……テープ状負極シート

【図1】



【図2】



【図3】

